



*Volume XXX*

*1997*

*Number 1*

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Perspective on the  
Effects of Military  
Service

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Madison Connecticut

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# A Life-Span Perspective on the Effects of Military Service

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For the last several years, we have been studying the developmental effects of military service on men's aging. By "developmental effects," we wish to accentuate the positive as well as

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An earlier version of this paper was presented at the conference "Even unto Old Age: The Long-Term Effects of Traumatic Experience," sponsored by the Boston Society for Gerontologic Psychiatry, Inc., Cambridge, Massachusetts, October 14, 1995. Moderator: David Blau, M.D.

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the negative effects, and to emphasize that there are both short-term and long-term effects. In this paper, we describe the life-span approach that we have adopted and outline its application to the study of military service. Our thesis is that military service is a “hidden variable” in men’s aging, and the failure to consider its consequences has important implications for the understanding of aging (Spiro, Schnurr, and Aldwin, 1994). To illustrate some aspects of the life-span perspective, we present results from our work with the Normative Aging Study. Although we espouse a life-span perspective, a first reading of our work might suggest that we do not take our own arguments seriously. This would be a mistaken reading, however, since our work should be viewed developmentally. We began our work to establish that military service was an important factor in the lives of veterans, and that it had positive as well as negative effects. These initial analyses were cross-sectional. More recently, we have begun to use existing longitudinal data from the Normative Aging Study to address developmental questions. As others have noted, using archival data to address questions of contemporary interest is often difficult and time consuming (Elder, Pavalko, and Clipp, 1993).

#### EFFECTS OF MILITARY SERVICE

Although application of a life-span perspective to military service is relatively new, a great deal of research has been conducted examining various outcomes of military service. Several authors (e.g., Schnurr and Aldwin, 1993) have summarized much of this research, often lamenting the lack of a developmental orientation. Most studies are either epidemiological or clinical, the former studying representative samples but with a

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This research has been supported by the Health Services Research and Development Service and the Medical Research Service of the Department of Veterans’ Affairs and by NIH Grants R29-AG07465 and R01-AA08941. The authors wish to thank Cheryl Hankin and Jessica Wolfe for their comments on earlier drafts.

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specific, nondevelopmental focus (e.g., Kulka et al., 1990), and the latter using convenience samples of patients who are currently in or seeking medical (Blake et al., 1990) or psychiatric (Rosenheck and Fontana, 1994) treatment. Clinical studies start with pathology in the individual and work backward to establish etiology, whereas developmental studies begin with an event and work forward to observe the unfolding of its effects (e.g., King and King, 1991; Clipp and Elder, 1996). Epidemiological and clinical research has focused on socioeconomic, psychological, and medical outcomes of military service.

### *Socioeconomic Outcomes*

Military service has numerous effects on education, family, and work careers. For example, military service often delays completion of education, family formation, and launching careers (Card, 1983; Anderson and Mitchell, 1992). However, these delays can translate into socioeconomic advantage (Xie, 1992) or disadvantage (Stellman, Stellman, and Sommer, 1988a; Cohen, Segal, and Temme, 1992; Bookwala, Frieze, and Grote, 1994), depending on societal factors such as the economy at the time of military entry and exit, availability of veterans' benefits, and the like.

### *Psychological Outcomes*

Some studies have reported that veterans and nonveterans have similar rates of psychiatric disorder (Norquist, Hough, Golding, and Escobar, 1990). Theater veterans may have some cognitive impairment, such as attention, memory, or concentration difficulties (Archibald and Tuddenham, 1965; Centers for Disease Control, 1988b; Sutker, Uddo-Crane, and Allain, 1991). Veterans with heavy combat exposure generally have more psychopathology or psychiatric disorders than others (e.g., Centers for Disease Control, 1988a; Kulka et al., 1990). Military service, especially combat, has negative effects on life satisfaction (Bookwala

et al., 1994) and on health behaviors such as use of alcohol, tobacco, and prescription drugs (e.g., Centers for Disease Control, 1988a; Solomon, 1988; Stellman et al., 1988a; Boyle, Decouflé, and O'Brien, 1989).

### Health Outcomes

The effects of military service on health are varied. In several studies comparing World War II veterans to nonveterans, veterans had lower mortality rates during initial follow-up, but these rates later converged to those of nonveterans. Seltzer and Jablon (1974) labeled this the "healthy soldier" effect. Studies comparing Vietnam era veterans to nonveterans found different results; initially there was a higher rate of external causes of death in the veterans, but it approached that of nonveterans over time (e.g., Hearst, Newman, and Hulley, 1986; Breslin, Kang, Lee, Burt, and Shepart, 1988). Although there have been no studies of the effects of posttraumatic stress disorder (PTSD) on mortality, several studies have examined the impact of trauma that place persons at relatively high risk of PTSD. Among World War II (Pacific theater only) and Korean War prisoners of war (POWs), mortality was higher than in comparison groups during the years shortly after repatriation, but the difference declined within a decade or so of follow-up (Keehn, 1980). Keehn, Goldberg, and Beebe (1974) reported excess mortality among World War II veterans who were given medical discharges for psychoneurosis. During the first decade of follow-up the excess was 45 percent, and it declined over the subsequent 14 years of follow-up to about 10–15 percent. The differences were especially high for death due to several specific disease categories (i.e., infectious or parasitic, digestive, cerebrovascular, inflammatory CNS) or to behavioral causes (i.e., alcoholism, suicide, homicide).

Certain aspects of military service, such as combat exposure, injury or disability, or being a POW, are associated with deleterious effects on health (Hrubec and Ryder, 1980; Boyle et al.,

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1989; Kulka et al., 1990; Eberly and Engdahl, 1991; Page, 1992; Schnurr and Aldwin, 1993; Rosenheck and Fontana, 1994) and increased health care use (Stellman, Stellman, and Sommer, 1988b; Kulka et al., 1990; Rosenheck and Massari, 1993; Spiro, Clark, Kressin, Miller, and Kazis, 1995); however, the effects seem to be larger on self-rated than on physician-diagnosed health (e.g., Centers for Disease Control, 1988b; Shalev, Bleich, and Ursano, 1990; Litz, Keane, Fisher, Marx, and Monaco, 1992). Wolfe, Schnurr, Brown, and Furey (1994) demonstrated that in women veterans the effects of combat exposure on health may be mediated through PTSD (cf. also McFarlane, Atchison, Rafalowicz, and Papay, 1994) or through PTSD's effects on health behaviors. For example, veterans with PTSD have lower effort tolerance (Shalev et al., 1990) and more unfavorable lipid profiles (Zimering, Norris, Lurie, and Hearst, 1994).

Several authors have suggested that combat exposure has long-term effects on cardiovascular health (Rosen and Fields, 1988; Blanchard, 1990). This is particularly interesting because recruits are often selected to be free of overt chronic diseases such as diabetes, hypertension, and cardiovascular disease (CVD). Thus, should a higher risk of CVD be found in veterans than in the normal population, it would suggest either a failure of screening or adverse effects of military service. Falger et al. (1992) reported that Dutch World War II Resistance veterans, especially those with PTSD, had greater cardiovascular risk (e.g., were more likely to have the Type A behavior pattern) than did recent surgical or heart patients.

#### THE LIFE-SPAN PERSPECTIVE

We propose the adoption of a life-span perspective on military service. What is a life-span perspective? How does it apply to the study of military service?

The life-span perspective is not a theory per se, but a way of viewing human development. The life-span perspective is

characterized by a set of theoretical propositions (see Table 1). In brief, these propositions assert that development is a lifelong process characterized by multidimensionality, multidirectionality, gains and losses, and variability both within and among persons. Development occurs in and is constrained by its sociohistorical context, and is subject to age-graded, history-graded, and nonnormative sets of influences. The study of development is inherently multidisciplinary.

The life-span view is characterized by a number of additional positions. First, age is a descriptive and not an explanatory dimension; it is one of several temporal axes along which change occurs, and may not be the most interesting one (Wohlwill, 1973). Rather than consider how PTSD varies with age, it might be preferable to adopt a different temporal axis and examine how PTSD varies with time since the precipitating event. For example, studies of World War II veterans demonstrated that the amount of time spent under combat conditions accounted for combat fatigue, rather than did predisposing factors such as age (Menninger, 1948). In the life-span view, the timing of an event in a person's life is also important; widowhood at age 30 is far less normative than widowhood at 80. The historical era in which an event occurs is important; at the beginning of the century, it was far more common to see 30-year-old than 80-year-old widows.

Second, the life-span perspective requires longitudinal data. Cross-sectional data are inadequate because they yield information on age-group *differences* rather than on age-related *changes*. To interpret cross-sectional differences as longitudinal changes is to commit the "life-course fallacy" (Riley, 1994). Third, change and development are not viewed as universal across persons or contexts (Dannefer, 1984). There is heterogeneity in development within persons, among persons, and among groups and these different aspects of variability should all be considered over time. The fallacy of "cohort centrism" assumes that members of all cohorts will age in the same way as the one under study (Riley, 1994). As Elder (1974) convincingly demonstrated, each cohort has a unique experience of history

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TABLE 1  
Core Theoretical Propositions  
of the Life-Span Developmental Perspective

Summary Concept	Theoretical Proposition
Life-span development	Development is a lifelong process, characterized by both continuous and discontinuous processes.
Multidimensionality	Development occurs in multiple domains.
Multidirectionality	Development is not necessarily monotonic; both positive and negative changes occur both within and between dimensions.
Gains and losses	The process of development is not simple but complex, consisting of the joint occurrence of gains (growth) and losses (decline). With aging, the balance between gains and losses becomes less positive.
Variability	There is a great deal of variability (heterogeneity) among persons, in level, rate, and direction of change. There is a great deal of variability (plasticity) within a person.
Historical embeddedness	Development varies, sometimes substantially, in relation to historical-cultural conditions.
Contextualism	The course of an individual's development can be understood as the outcome of three interrelated systems of influence: age-graded, history-graded, and nonnormative.
Multidisciplinary	The study of development is inherently multidisciplinary.

Note: Adapted from Baltes (1987).

during its early years, and this has effects on the remainder of the life course.

#### MILITARY SERVICE FROM A LIFE-SPAN PERSPECTIVE

These and other aspects of the life-span perspective have implications for the study of military service. The life-span view recognizes that there is both continuity and discontinuity in

development. In the case of trauma and aging, it must be recognized that events that happened long ago can continue to have important influences on current behavior (e.g., Falk, Hersen, and Van Hasselt, 1994). Numerous case reports suggest that combat-related psychiatric symptoms can occur among previously asymptomatic veterans even 50 years after combat (Christenson, Walker, Ross, and Maltbie, 1981; Hamilton, 1982; Van Dyke, Zilberg, and McKinnon, 1985; Pary, Turns, and Tobias, 1986; Richmond and Beck, 1986; Pomerantz, 1991). It is important to note that reexposure to combat-related stimuli or life-threatening situations did not occur in any of these cases, and only two cases (Pary et al., 1986; Richmond and Beck, 1986) seem to have experienced psychiatric symptoms previously. One hypothesis is that these veterans suffered from the delayed *recognition* of their conditions (Pary et al., 1986); another is that a delayed *onset* of PTSD resulted from experiencing stressful events often associated with aging, such as retirement or bereavement (Archibald and Tuddenham, 1965; Falk et al., 1994).

The life-span view suggests a focus on positive as well as negative outcomes of military service (e.g., Aldwin, Levenson, and Spiro, 1994; Lee, Vaillant, Torrey, and Elder, 1995). Not everyone who is exposed to the stresses and traumata of military service develops psychiatric disorders or health problems; many maintain or return to their prior level of functioning, while others thrive in response to challenge and achieve a higher level of function than before through an increase in mastery, a change in perspective, or a strengthening of social ties (Aldwin, 1994; O'Leary and Ickovics, 1995). The study of positive outcomes of military service is in its infancy, yet there is evidence that such outcomes do exist (e.g., Monks, 1957; Lyons, 1991; Wolfe, Keane, Kaloupek, Mora, and Wine, 1993). For example, positive appraisals of the effects of service are associated with an attenuation of the effects of combat on PTSD (Aldwin et al., 1994). Other studies have found that peripheral (Schnurr, Rosenberg, and Friedman, 1993) or heavy (Elder and Clipp,

as access to job training, educational benefits, and the development of personal resources (e.g., mastery, hardiness). In life-span terms, there are both "gains and losses" associated with experiencing trauma.

In closing, we suggest that military service can alter not only the psychology of aging, but the physiology and the sociology of aging as well. Veterans comprise a majority of the current population of older men. There is a possibility that their military service continues to affect their aging, and insofar as we neglect this, we may be mistaking a historical contingency for a universal necessity. How many of the differences we observe between younger and older men are the result of cohort differences in life experiences such as military service rather than of aging per se? Are the declines in Type A behavior pattern and CHD that have been observed over the last 10–15 years due to a declining proportion of combat-exposed men in the population? Could the memory declines often observed with aging result in part from long-term effects of combat exposure? How many older men are inappropriately seeking medical care rather than psychiatric treatment for the effects of combat exposure? Unless we begin to address such questions, we can only guess at the answers.

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be mistaken for the effects of aging. First, we have examined whether measures developed to assess PTSD in younger Vietnam veterans are useful for older veterans. Should the same cut-off scores be used on these questionnaires, regardless of age, to make the putative diagnosis of PTSD? Assuming that these measures are valid for older veterans, we have demonstrated the existence of PTSD among older veterans, and that its current prevalence is related to combat exposure. Second, we have explored changes in distress (i.e., PTSD) over time in response to trauma (i.e., combat exposure). We are in the process of examining the impact of certain "stressful" life events such as retirement on these changes. Third, we are studying the long-term effects of military service on health outcomes, considering mental and physical health, health care utilization, and, in future work, health measured more objectively (e.g., physician diagnoses, diagnostic measures).

The claim that military service is a hidden variable requires further investigation. Psychologists and other social scientists have generally ignored the role of military service and associated trauma such as combat in men's lives. However, the recent volumes by Wilson, Harel, and Kahana (1988) and by Aldwin (1994) are exceptions to the relative dearth of texts that consider the roles of either military service or trauma on adult development and aging.

We urge both researchers and clinicians to assess the military experience of older men, at least at the dichotomous level (i.e., whether or not one is a veteran). It would be ideal if information could be obtained that would permit a more accurate determination of the various aspects of military service, such as the extent of exposure to hardship, deprivation, and combat. Even in the VA, few veterans reported being asked about combat exposure or PTSD when seeking mental health treatment (Stellman et al., 1988b). Conversely, it is important to recognize and assess the potential positive effects of military service, such

1989) combat exposure is associated with subsequent beneficial personality and mental health outcomes.

The life-span view encourages multidimensionality. This suggests that both trauma (e.g., combat exposure) and outcome (e.g., PTSD, health) should be considered as multidimensional. There seems to be growing recognition that combat is a multidimensional construct, and even "traditional" combat exposure (Elder and Clipp, 1988) can be defined in terms of intensity, frequency, and duration. In addition, some domains of combat exposure (e.g., witnessing or participating in atrocities) are more common in some eras than in others, while other domains, such as malevolent environments, may be more generic (Fontana and Rosenheck, 1994; Rosenheck and Fontana, 1994; Wolfe, Brown, and Kelley, 1994; King, King, Gudanowski, and Vreven, 1995). Dimensions of combat exposure also vary with gender (Wolfe, Brown, Furey, and Levin, 1993; Wolfe, Brown, et al., 1994; King et al., 1995). The life-span view also encourages consideration of PTSD as a multidimensional entity, recognizing that it consists of three cardinal symptoms: intrusion, avoidance and numbing, and increased arousal (American Psychiatric Association, 1987). Some evidence suggests that the relations among these three symptom clusters vary over time or across groups (e.g., Southwick et al., 1995). In the National Vietnam Veterans Readjustment Study (NVVRS), Kulka et al. (1990) found that the reexperiencing and arousal criteria were more prevalent among theater than among non-theater veterans, but that the numbing/avoidance criterion was not. Similar results were reported by Norris (1992) for some events (e.g., Hurricane Hugo, combat), but not for others (e.g., robbery, assault).

Related to a multidimensional view of PTSD is a perspective on "partial PTSD." Kulka et al. (1990; also Weiss et al., 1992) suggested that veterans with the constellation of sufficient B and D symptoms, but insufficient C symptoms, and with comorbid substance or alcohol abuse, had "partial PTSD" and were

using drugs to self-medicate. Among older veterans, it is possible that workaholicism is another means of self-medication that could account for partial PTSD (Lipton and Schaffer, 1988). Clinicians should be aware of these possibilities, and also of the relatively high degree of comorbidity (e.g., anxiety or mood disorders in the elderly, and antisocial personality or substance abuse in younger veterans) associated with PTSD (e.g., Sutker et al., 1991), which can lead to misdiagnosis.

The life-span view suggests the need for longitudinal studies that follow persons over time, in order to understand individual differences in vulnerability and resilience to traumatic events (Elder and Clipp, 1989; Engdahl, Harkness, Eberly, Page, and Bielinski, 1993) and in the developmental courses that persons take in response to events (Elder et al., 1993; Schnurr, Spiro, Aldwin, and Stukel, 1996). Although longitudinal prospective studies that assess persons before and after military service are preferred, few have been conducted (Card, 1983; Schnurr et al., 1993; Lee et al., 1995). More common are longitudinal studies that have examined post-service effects over time (e.g., Southwick et al., 1995).

Both conceptual models and statistical methods should focus on change within individuals over time, rather than on group differences. Often the former is of conceptual interest, but the analysis focuses on the latter. Appropriate methods for the longitudinal analysis of individual trajectories (e.g., Diggle, Liang, and Zeger, 1994) are becoming increasingly easier to apply and should be more widely used (e.g., see Schnurr et al., 1996). Too often longitudinal data are collected but the analyses fail to divulge potential differences in individual trajectories because group trends are examined without due consideration of the variability within the groups. Do symptoms of PTSD wax and wane in all individuals (Zeiss and Dickman, 1989)? Is one symptom cluster typically higher, or do the relations among intrusion, numbing, and arousal vary over time? What are the typical

1991). In the second, we will model the trajectory of each veteran, to better examine differences in patterns of change that have been suggested in other studies (e.g., McFarlane, 1988; Zeiss and Dickman, 1989).

### *How Does PTSD Affect Health?*

Our newest project involves modeling the effects of PTSD on physical health. We hypothesize that PTSD or injury due to trauma can mediate the effects of traumatic exposure on health. Both injury and trauma have direct effects on health outcomes (e.g., self-rated health, health care use). PTSD can affect health directly, or indirectly through health behaviors (alcohol or tobacco consumption) or psychological correlates of PTSD (e.g., hostility, depression, avoidance coping). For example, we have found that PTSD symptoms are associated with alcohol problems in older men (Kressin, Spiro, and Levenson, 1994). Much research has shown that veterans with PTSD report increased morbidity, greater use of health care, and altered physiological and biochemical profiles. Friedman and Schnurr (1995) suggested that the best-documented biological abnormalities associated with PTSD (e.g., enhanced cardiovascular reactivity, autonomic hyperarousal, disturbed sleep physiology, adrenergic dysregulation, enhanced thyroid function, and altered HPA activity) are associated with increased risk of a number of medical conditions. In addition, a number of psychological (e.g., depression, hostility, poor coping) and behavioral (e.g., obesity, tobacco and alcohol consumption) correlates of PTSD are known to be risk factors for adverse health outcomes. Preliminary examinations of the PTSD-mediation model are encouraging (Wolfe, Schnurr, et al., 1994; Friedman and Schnurr, 1995).

### DISCUSSION

In our work, we have focused on three issues, all related to our hypothesis that military service has effects on health that might

### *What Is the Longitudinal Course of PTSD?*

To address this question, we conducted a longitudinal analysis of change in PTSD symptoms (Schnurr et al., 1996). We developed a 29-item PTSD scale from the Cornell Medical Index (CMI; Brodman, Erdmann, and Wolff, 1956) which has been administered regularly to NAS men since 1963. Interestingly, the CMI was developed from an instrument used during World War II to screen recruits (Weider, Mittelman, Wechsler, and Wolff, 1944). Our CMI-based scale had acceptable convergent validity with the Mississippi Scale ( $r = .5$ ); however, it was not strongly related to combat exposure ( $r < .1$ ).

We modeled change in PTSD symptoms over the age span from 30 to 75, using data on 1,079 NAS veterans of World War II and Korea. Rather than examine the individual symptom trajectories, each veteran's data contributed to a portion of the age range (25 years, on average), using a method for analyzing longitudinal data (Diggle, Liang, and Zeger, 1994). We studied the effects of combat exposure, civilian trauma, and presence of any PTSD symptoms at baseline on both (1) level of PTSD symptoms and (2) change in PTSD symptoms. Veterans with any PTSD symptom at baseline had consistently higher levels of PTSD symptoms across the age range from 30 to 75. There was also an effect of age, with a 43 percent increase in PTSD symptoms for each decade increment in age. However, these effects were qualified by an age by baseline PTSD interaction. Symptom levels of men who did not have any PTSD symptoms at baseline increased with age; men who had PTSD symptoms at baseline did not change with age. Men who had initial PTSD symptoms were always higher than men without, even though the former did not change and the latter increased.

We are currently expanding this work in two directions. First, we are investigating the effect of retirement on change in the symptom trajectory. This was spurred by several case studies suggesting either a delayed onset or delayed recognition of PTSD following retirement (e.g., Pary et al., 1986; Pomerantz,

courses of PTSD symptoms over time? Longitudinal studies using multidimensional measures can help answer these questions, but only if the proper analyses are conducted will the results be most informative.

### DEVELOPMENTAL EFFECTS OF MILITARY SERVICE

Our thesis is that military service is a "hidden variable" in the life-span development of current cohorts of older men (Spiro et al., 1994). What do we mean by this thesis? Why is it important? What should we do about it?

#### *Military Service as a Hidden Variable*

Psychologists seldom consider the effects of sociohistorical events such as war on human development, despite growing agreement that development is a function of contextual as well as individual factors. As Laufer (1988) commented, "there is no theory of adult development that takes into account either empirically or theoretically the role of war as a systematic component of the adult lifeline" (p. 48). Our work is an attempt to redress this wrong from a psychological perspective.

The life-span perspective explicitly recognizes the historical context of development, as illustrated by studies examining differences in adolescent personality or adult intelligence across birth cohorts (Baltes, Cornelius, and Nesselrode, 1979). The study by Baltes et al. and similar studies generally have concluded that there are differences in development among birth cohorts. However, few studies have examined differences within a given cohort. One exception is Elder (1974), who examined children in the 1920–1921 birth cohort, finding that the effects of the Great Depression on personality and behavior varied by life stage and by degree of economic deprivation.

Despite these classic examples of the effects of historical events on human development, we have been slow to recognize that what we know (or think we know) about aging is in large

part limited to recent cohorts of elderly who have shared a similar historical context. Thus, our current knowledge may not generalize to future elderly. For example, Rossi (1980) points out that most of our knowledge about adult development is based on persons (often men) born during the 1920s and 1930s. Many of these persons experienced the Great Depression as children and adolescents, and served in the military during World War II and in Korea. The potential effects of these men's military experiences in general, and their combat exposure in particular, are largely overlooked. How many studies have considered the potential effects of military service on older men's personality, health, or adaptation to life? How many clinicians ask their older male patients whether they were in the military, and how their experiences affected their lives?

When we refer to military service as a "hidden variable" in adult development, we intend to emphasize that over 60 percent of men age 55 or older are veterans of World War II or Korea, and that about 40 percent of these men, or about 25 percent of the total, were exposed to combat (U.S. Department of Veterans' Affairs, 1989). The aging veteran constitutes a substantial proportion of the adult male population. In the current decade, the number of veterans aged 65 and older will increase by half, from 6 to 9 million, accounting for 63 percent of men over age 65 (U.S. Department of Veterans' Affairs, 1991).

The notion of military service as a hidden variable implies that certain contingent aspects of history that were experienced by only some persons in a cohort (e.g., 55% of World War II and 31% of Korean veterans were in combat; U.S. Department of Veterans' Affairs, 1995) can alter or affect the aging process in those so exposed. More specifically, we are suggesting that combat during World War II or in Korea has affected the aging processes of some veterans. The effects of such trauma can be manifest in many aspects, such as increased risk of cardiovascular diseases, general psychomotor slowing,

examined the relation of both objective (e.g., rank) and subjective (e.g., combat exposure) aspects of military service to recent health care utilization by NAS veterans, controlling for known predisposing (e.g., education, marital status), enabling (e.g., having a regular source of care), and need (e.g., self-rated health) factors. In a two-part model (Manning, Duan, and Rogers, 1987), we first studied the likelihood of any use during the past 6 months. Among those who reported use, we then predicted the amount of use (i.e., number of outpatient visits or inpatient stays).

World War II veterans and men with less combat exposure were more likely to have had an outpatient visit, controlling for education, having a regular source of care, and self-rated health. Among the 74 percent who had an outpatient visit, veterans with more symptoms of PTSD had more visits, controlling for age, marital status, having a regular source of care, and self-rated health. World War II veterans were more likely to have had a recent hospitalization, controlling for self-rated health. Among the 10 percent who reported a hospital stay, military factors were not associated with the number of such stays after controlling for education.

Future research on older men should consider the role their military service might play in explaining their health care utilization. Note that VA patients are the tip of the iceberg when it comes to veterans, since they constitute only about 10–20 percent of all veterans (U.S. Department of Veterans' Affairs, 1995). VA users are much more likely than other veterans to have higher combat exposure, greater injury or disability, lower income, and less health insurance (Stellman et al., 1988b; Rosenheck and Massari, 1993). It is important to recognize that knowledge of the health care use of older veterans from World War II and Korea might not generalize readily to veterans of Vietnam and the Persian Gulf, for a variety of reasons (e.g., differences in military recruiting, combat exposure, and in societal circumstances subsequent to discharge).

PK scores, controlling for age. For the Mississippi, only combat exposure was significant ( $p < .001$ ), accounting for 6 percent of the variance. For the PK, only major civilian trauma was significant ( $p < .01$ ), accounting for 1 percent of the variance.

This suggests that in these older veterans, the PK scale may be measuring PTSD (or psychopathology) in general, rather than measuring combat-related PTSD, as does the Mississippi Scale (cf. also Moody and Kish, 1989).

### *What Moderates the Effects of Combat on Mental Health?*

We have examined whether appraisals of the positive and negative effects of military service mediated the effects of combat exposure on PTSD (Aldwin et al., 1994). Men reported more positive (e.g., mastery, increased coping skills) than negative effects; both increased linearly with the level of combat exposure. Path analysis demonstrated that the two appraisals were independent and opposite mediators of the effect of combat exposure on PTSD, even controlling for depressive symptoms or response style. Depending on the model, 25–30 percent of the effects of combat on PTSD were mediated through the appraisals.

These results illustrate the importance of studying not only the amount of traumatic exposure, but also the individual's perception of its costs and benefits. Events are multidimensional in nature, and different persons may focus on different aspects of events at different stages of their life (i.e., there are person by event by time interactions).

### *Is Military Service Related to Health Care Utilization?*

We considered whether military service might be a hidden variable in the explanation of health care utilization by older veterans (Spiro et al., 1995). We adapted Andersen's (Andersen and Newman, 1973; also Rosenheck and Massari, 1993) behavioral model of utilization to include aspects of military service. We

and increased rate of psychiatric disorders. Insofar as the current cohort of older men contains more combat-exposed veterans than earlier or later cohorts, and if combat affects the aging process, it is possible that we are mistaking the effects of the historical contingency of combat exposure for general principles of aging. For example, if combat affects either cardiovascular function or cognitive processes, it is possible that our current understanding of heart disease or of dementia is in whole or in part the result of combat's effects in the current cohort of older men, and is not generalizable to future cohorts. If policy is formulated on the basis of our knowledge of the current cohort of older men, and if future cohorts differ systematically in important ways, our decisions are likely to be incorrect.

### *Why Is Military Service Important?*

One of the contributions of the life-span approach has been the recognition that human development is not simply a function of ontogenetic (individual) psychological processes, but of historical and social processes as well (Baltes, 1987; Dannefer, 1988). Consider the major longitudinal studies of aging, such as Terman, Oakland, Berkeley, Baltimore, Duke, Seattle, and the Normative Aging Study (Schaie, 1983).<sup>1</sup> The men in each of these studies were born in the first third of the twentieth century, grew up during the Great Depression, and were mobilized during World War II and perhaps in Korea as well. Two of the seminal sociohistoric events of the twentieth century occurred during their early adulthood and set the tone for their entire lives, yet most psychologists completely ignore this fact. It is generally assumed that the aging of these men does

<sup>1</sup>According to Clipp and Elder (1996), 90 percent of the men in the Oakland study, 73 percent of those in the Berkeley study, and 45 percent of those in the Terman study were veterans. We have previously reported that over 95 percent of NAS men were veterans (Spiro et al., 1994); the veteran composition of the remaining studies is unknown to us.

not differ from that of earlier cohorts (such as were studied in the Kansas City or National Institute of Mental Health studies, or the Framingham Heart Study) or of later cohorts, such as the Baby Boomers.

As the case of military service makes clear, there is also a tendency to ignore the extent of variability within a cohort. Even during the near-total mobilization of World War II, not all men served; among those who served, not all experienced combat; among those who did, some were more vulnerable to combat's effects while others were more resilient. Among the current population of older men, military service is an important source of intra-cohort heterogeneity (e.g., Dannefer, 1988), due to its own effects as well as to its indirect effects, such as access to the GI Bill for education and housing. As Vaupel and Yashin (1985) have demonstrated, one can easily draw incorrect inferences concerning outcomes (e.g., survival) in a population that is actually a mixture of heterogeneous subpopulations.

Ignoring the role of military service in men's lives, and of combat exposure in particular, leads to viewing the effects of these contingent historical experiences as universal. In other words, what we think we know to be aging may in fact be the result of (1) intra-cohort differentiation in the past (e.g., some served in military; some saw combat in World War II; some were recalled for Korea), combined with (2) differential selection and survival across these subgroups. By studying aggregates and ignoring variability within them, we run the risk of mistaking changes in the composition of a cohort for the effects of aging (Dannefer, 1988; Riley, 1994).

In addition to assuming that all cohorts are alike, it is often assumed that a given event has a uniform impact or texture. This seems to be the perspective adopted in DSM-III-R (American Psychiatric Association, 1987) that a trauma is a trauma is a trauma, despite evidence of individual differences in both the risk of and the reaction to putatively traumatic events (e.g., Breslau, Davis, Andreski, and Peterson, 1991; Norris, 1992;

respectively. In our sample, the experience of civilian and military trauma were significantly associated ( $r = .19$ ,  $n = 1,115$ ). Of the men with no combat exposure, 55 percent reported civilian trauma, compared to 68 percent of men with moderate exposure, and 71 percent of those with heavy exposure ( $\chi^2 [n = 1,115, 2df] = 21.11$ ,  $p < .001$ ).

Trauma happens. But not everyone who is exposed develops PTSD. Why not? What are the variables that determine resilience and vulnerability to trauma? Breslau and colleagues (Breslau, Davis, Andreski, and Peterson, 1991; Breslau et al., 1995) suggest that personality factors such as neuroticism predict liability to traumatic exposure; Elder and Clipp (1988, 1989) suggest that social relationships (both during and after) moderate the effects of combat; Wolfe, Keane, et al. (1993) found that nonavoidant coping was associated with positive outcomes among heavy combat veterans. In addition to such person variables, there is evidence that group variables (e.g., unit cohesion, morale, leadership) moderate the negative effects of combat (Ingraham and Manning, 1986).

### *Among Older Veterans, Are PTSD Measures Related to Different Kinds of Trauma?*

Given that scores on the Mississippi scale, but not on the MMPI-2 PK scale, were correlated with combat exposure, we wondered whether the PK was more sensitive to trauma in general. We related scores on two measures of PTSD (Mississippi, MMPI-2 PK) to age, combat exposure, and three indices of lifetime civilian exposure to traumatic events. The first of these indices assessed the respondent's exposure to severe accidents, violent crimes, or disasters. The second index assessed job-related exposure to severe accidents, violent crimes, disasters, and injuries in the line of duty. The third index assessed exposure to other major trauma (not including combat).

Using multiple regression, we regressed these measures of combat and lifetime civilian trauma on both Mississippi and



TABLE 6  
Predicting PTSD Symptom Factors from Combat Experiences

Predictor	Intrusion	Numbing/ Arousal	Positive Adjustment	Depression
World War II Noncommissioned officer		2.4		
Officer			2.6	
Survivor guilt	6.4	6.8	-2.5	1.8
Combat exposure <sup>a</sup>	1.5	1.0		
Participate in major battle				
Wounded		3.0		2.2
Unit kill enemy				
Personally kill enemy	4.1			
Intercept <sup>b</sup>	45.4	43.7	50.3	48.9
<i>R</i> <sup>2</sup>	19.9	15.0	2.2	3.1

Note: Table entries are unstandardized regression coefficients, and indicate the extent of change in standardized symptom scores ( $M = 50$ ,  $SD = 10$ ) associated with the predictor. For example, World War II veterans have a score 2.4 points higher on Numbing/Arousal than do veterans who served in Korea.

<sup>a</sup>For the combat exposure scale, the effect is that associated with an increase of one standard deviation.

<sup>b</sup>Symptom factor score if all other variables are  $\phi$ .

to know the extent to which these relations are similar across different wartime eras. Some research suggests that among Vietnam veterans, witnessing or participating in atrocities is differentially related to PTSD (e.g., Fontana and Rosenheck, 1994; King et al., 1995), but this research has not examined PTSD as a multidimensional construct.

#### *What Is the Role of Noncombat Trauma?*

We assessed civilian (noncombat) trauma using the 11-item measure described previously. We found that 63 percent of the NAS veterans reported that either they or family members had experienced significant civilian trauma during their lives, for example, accidents, injuries, criminal victimization, and natural disasters. Norris (1992) and Kessler et al. (1995) have reported similar prevalences in older adults and younger adults,

Breslau, Davis, and Andreski, 1995; Kessler, Sonnega, Bromet, Hughes, and Nelson, 1995). Whether an event is traumatic depends on the person and his or her situation at the time the event is experienced and afterward. There is a great deal of evidence suggesting that military service is a complex series of events rather than a single, homogeneous one. As with other events, there are both positive (e.g., increased skills, both personal and professional; maturity; independence; improved access to education, housing and health care; broadening of experience and horizons) as well as negative (e.g., separation from family and loved ones; increased risk of stress, trauma, and injury) aspects.

There are also differences among eras in various aspects of military service. Fontana and Rosenheck (1994) found differences in combat experiences among World War II, Korean, and Vietnam veterans. Others suggest that Persian Gulf veterans underwent a unique set of combat experiences, including SCUD missile alerts or attacks and the threat of chemical/biological warfare (e.g., Wolfe, Brown, et al., 1994). In addition to differences in exposure between eras, there are also significant differences in exposure within an era, even among those with a presumably similar status. For example, POWs during World War II had very different experiences depending on whether they served in the European or the Pacific theaters (Page, 1992).

#### *What Should We Do?*

Little is known about the veteran composition or military service of most samples. In ongoing studies, it would be well worth the effort to identify the veterans, and to examine their exposure to combat or other trauma. In 1989, we began to consider the impact of military service on men in the Normative Aging Study. In general, we strongly encourage investigators to consider the historical context of the participant's lives, and when appropriate, to assess relevant aspects of military service and

combat exposure. Only when we begin to assess these aspects of men's lives can we determine whether military service is a *hidden* variable, or an *invisible* one (i.e., one that has no effects).

#### THE NORMATIVE AGING STUDY

The Normative Aging Study (NAS) is a longitudinal, interdisciplinary study of the aging process in men (Bossé, Ekerdt, and Silbert, 1984; Bossé and Spiro, 1995). Over 6,000 men from the Boston area were recruited from large organizations with a stable workforce, including a major insurance company, the post office, and police and fire departments. Screening for admission into the study was conducted in three phases (Dawber and Thomas, 1972) to select a sample of men in good health (i.e., with no disabling chronic conditions, blood pressure [BP] of 140/90 or less) and who were geographically stable, to permit long-term follow-up.

#### *Panel Composition*

The study panel consists of 2,280 initially healthy men who were enrolled between 1961 and 1968, aged 21–80 years ( $M = 42$ ,  $SD = 9$ ). Most men (74%) were born between 1915 and 1934, and were age 35–64 at study entry. As of June 1995, 478 (21%) have died; of the remaining 1,802, 86 percent are still participating. It is important to emphasize that NAS participants are *not* Department of Veterans' Affairs (VA) patients; instead, they are a sample of community-residing men, most of whom happened to be veterans.

Most of the men in the NAS panel were white. Less than 2 percent were black; the corresponding figure for metropolitan Boston in 1970 was 3.7 percent (Bossé et al., 1984). Most of the men (86%) had a high school diploma; 28 percent had at least a college degree. The average socioeconomic level was higher than that of the general Boston population in 1970.

sample consisted of the 590 NAS combat veterans who served during World War II or in Korea and who completed the Mississippi PTSD Scale. Four oblique factors were extracted and interpreted as Intrusion (12 items), Numbing/Arousal (12), Positive Adjustment (10), and Depression (2). Note that factors are extracted in decreasing order of the amount of variance they explain. Factor correlations were low to moderate. The highest correlation was .44 between Intrusion and Numbing/Arousal; the lowest was  $-.06$  between Positive Adjustment and Depression.

Scales were defined by summing scores on the items that loaded a given factor, and were then converted to *T*-scores ( $M = 50$ ,  $SD = 10$ ). The scales had acceptable internal consistency reliabilities (Cronbach's alphas ranged from .61 to .82). Regression analysis was used to relate these PTSD symptom factors to combat exposure, controlling for other aspects of military service (e.g., era, highest rank). We found that the PTSD factors were differentially related to aspects of combat (Table 6). Men with survivor guilt, heavier combat exposure, and who thought they had personally killed the enemy had more intrusion symptoms ( $R^2 = 20\%$ ). Higher scores on Numbing/Arousal were associated with service during World War II, survivor guilt, heavier combat exposure, and being wounded ( $R^2 = 15\%$ ). Positive Adjustment was associated with having been an officer and with *not* having survivor guilt ( $R^2 = 2\%$ ). Depression was associated with survivor guilt and being wounded ( $R^2 = 3\%$ ). After controlling for mental health (based on MMPI-2 validity and clinical scales administered in 1986), Adjustment was no longer related to combat experiences; Depression was related only to having been wounded. The relations of Intrusion and Numbing/Arousal to combat experiences remained after controlling for mental health (results not shown).

These results suggest that different aspects of a traumatic event (i.e., different aspects of combat exposure) vary in their relation to clusters of PTSD symptoms. It would be interesting

TABLE 5  
Negative Outcomes of Military Service  
by Combat Exposure Level ( $N = 1,224$ )

Outcomes	COMBAT EXPOSURE LEVEL $\chi^2(df=2)$			
	None <sup>a</sup>	Moderate <sup>b</sup>	Heavy <sup>c</sup>	
Family and Career Costs (%)				
Economic problems	11	13	11	0.90
Disrupted my life****	23	32	37	15.13
Lonely for my wife, children***	16	23	14	10.52
Delayed my career***	22	30	33	11.30
Hurt my marriage	2	3	4	2.30
Separation from loved ones ****	38	52	61	33.18
Deprivations and Stresses of Combat (%)				
Combat anxieties****	2	19	35	137.78
Waste of time, boredom	12	12	9	0.94
Misery, discomfort****	8	19	33	56.00
Loss of friends****	6	13	28	48.20
Lost my good health****	2	8	20	54.24
Drinking problem	4	5	9	4.53
Bad memories or nightmares****	1	9	27	104.09
Death and destruction****	3	23	46	179.44

<sup>a</sup> $N = 707$  (58% of total sample). <sup>b</sup> $N = 421$  (34%). <sup>c</sup> $N = 96$  (8%).

\* $p \leq .10$ . \*\* $p \leq .05$ . \*\*\* $p \leq .01$ . \*\*\*\* $p \leq .001$ .

negative outcomes in terms of family and career costs. However, with respect to items assessing deprivations and stresses of combat, heavy combat veterans reported more negative outcomes than did either of the other two groups.

In concert, these results indicate that combat exposure is associated with both positive and negative outcomes, and that heavy combat exposure is particularly associated with negative outcomes (see also Elder and Clipp, 1989; Aldwin et al., 1994).

#### *Are Different Aspects of Military Experience Related to PTSD Symptoms?*

We examined the structure of PTSD by conducting a factor analysis of the 35-item Mississippi Scale (Spiro, 1993). Our

Twenty-three percent were employed in professional occupations, 21 percent were managers or proprietors, and 28 percent were service workers (mostly police and firemen). Only 4 percent were laborers or operatives.

We obtained information on military service for most (> 97%) of the original panel at study entry (1961–1968). As is characteristic of many men born during the first third of the twentieth century, the majority (94%) served in the military, most (90%) during wartime. Nearly half of the men (44%) saw combat, including over half of the men born between 1910 and 1929.

#### *Study Procedures*

NAS participants report regularly for a medical exam and laboratory measurements. Mail surveys have been conducted periodically since the early 1970s. Our data on military service came from surveys on military experience that were mailed to 1,742 men in February 1990 (83% response) and to 1,725 in November 1990 (81% response). Of the 1,381 men who responded to the first 1990 survey and were veterans, 1,263 served in World War II (67%) or in Korea (33%). These men ranged in age from 50 to 87 ( $M = 67$ ,  $SD = 7$ ); they comprise the subsample that we have studied in regard to military service. See Spiro et al. (1994) for information regarding the nonrespondents.

We assessed characteristics of military service such as mode of entry into service, era, branch, location of service, and rank. Most men served in the Army (47%) or Navy (32%). The majority enlisted (58%); about one third were drafted (35%). Roughly equal numbers of men served in the European or African (35%), Asian or Pacific (35%), or stateside (31%) theaters. Half of the men attained the rank of noncommissioned officers; 13 percent were officers.

We used Keane et al. (1989) combat exposure scale (CES) to assess combat. Since pilot testing showed that this scale, developed on Vietnam veterans, did not adequately assess combat

exposure among veterans of earlier wars, we included two items from Elder and Clipp (1988), one assessing duration of time in combat conditions and one assessing exposure to the outcomes of combat (e.g., wounded or dead people). In addition, we also asked whether the participant or members of his unit had killed anyone in combat; whether they had been wounded; and whether they had experienced survivor guilt (Table 2).

We assessed both positive and negative influences of military service using 28 items from Elder and Clipp (1989). The items were evenly split between positive (e.g., broader perspective on things) and negative (e.g., disrupted my life). For each item, participants were asked to indicate the extent to which they experienced each one on a 4-point scale (not at all, a little, somewhat, a lot). For each item, responses were dichotomized, and men who indicated either of the latter two responses were considered to endorse the item. Based on Elder and Clipp (1989), the negative influences were grouped into two categories (family and career costs, deprivations and stresses of combat) and the positive influences into three (developmental benefits, attitudes, and options and skills).

Because so little is known about PTSD and its assessment in older men, we used two measures to assess symptoms. One was the Mississippi Scale for Combat-Related PTSD (Keane, Caddell, and Taylor, 1988). We used the cutoff score of 89 for community samples, as suggested by Kulka et al. (1991; also Page, 1992) to indicate whether a veteran was considered to have PTSD. We also used the Keane PTSD scale (PK; Keane, Malloy and Fairbank, 1984; Lyons and Keane, 1992), based on an administration of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) Experimental Form (AX) in 1986 (78% response rate; Butcher et al., 1991). A veteran was considered to have PTSD if his score was 14 or greater (Kulka et al., 1991).

Note that the cutoff score for PTSD symptoms on both the Mississippi Scale and on the PK scale were based on data from Vietnam veterans. While the NVVRS (Kulka et al., 1990, 1991)

TABLE 4  
Positive Outcomes of Military Service by  
Combat Exposure Level ( $N = 1,224$ )

Outcomes	COMBAT EXPOSURE LEVEL $\chi^2(df = 2)$			
	None <sup>a</sup>	Moderate <sup>b</sup>	Heavy <sup>c</sup>	
Developmental Benefits (%)				
Lifelong friends****	21	35	38	29.39
A broader perspective on things	77	80	81	1.86
Learned to cope with adversity*	79	83	87	4.96
Greater self-discipline	83	87	85	2.41
Learned cooperation, teamwork**	76	83	84	8.68
Became more independent	81	84	86	2.28
Options and Skills (%)				
Improved life through education**	54	61	63	7.10
Better job skills and options	47	53	54	4.05
Attitudes (%)				
Value life more****	74	83	93	24.47
Positive feelings about self**	80	86	86	6.99
Became proud to be an American**	87	90	95	6.08
Clearer direction and purpose in life**	65	72	75	8.92
Rewarding memories	71	73	72	0.82
Appreciate peace more****	80	90	94	29.48

<sup>a</sup> $N = 707$  (58% of total sample). <sup>b</sup> $N = 421$  (34%). <sup>c</sup> $N = 96$  (8%).

\* $p \leq .10$ . \*\* $p \leq .05$ . \*\*\* $p \leq .01$ . \*\*\*\* $p \leq .001$ .

a positive developmental benefit of military experience, compared to 35 percent of those with moderate combat exposure and 38 percent of those with heavy combat exposure. This difference among combat exposure groups was significant,  $\chi^2(n = 1,224, 2 df) = 29.39$ . Further examination of Table 4 reveals that combat veterans, both those with moderate and with heavy exposure, were more likely to report favorable outcomes than noncombat veterans.

Table 5 presents corresponding results for negative outcomes of military service, divided into two groups. In general, combat veterans, regardless of exposure level, reported more

are married. These men completed measures of combat exposure (Laufer, Gallops, and Frey-Wouters, 1984) and PTSD (Weathers, Litz, Herman, Huska, and Keane, 1995) at baseline. From the baseline sample, we selected 1,002 men who served in World War II (71%) or Korea (29%), to facilitate comparison with the NAS.

Among this sample of VA ambulatory patients, 52 percent were in combat (61% in World War II, 29% in Korea). The prevalence of current PTSD among the combat veterans was 14 percent. Among World War II veterans, the prevalence was 13 percent; and among Korean veterans, it was 17 percent. These prevalences are lower than those reported by Rosenheck and Fontana (1994) for veterans seeking treatment for PTSD (55% of World War II and 65% of Korean veterans), but similar to those reported by Garfein et al. (1993) for VA patients seeking mental health care (12% among World War II and 7% among Korean veterans). This supports our contention that the low prevalence of PTSD among NAS veterans may be due more to their selection for health and their relatively advantaged social position than to a low prevalence of PTSD among older veterans in general.

#### *Does Combat Exposure Have Positive Effects?*

Elder and Clipp (1989) reported that heavy combat veterans reported both more positive and more negative effects of military service. To replicate this finding, we divided NAS veterans into three groups, based on their combat exposure scores: none (58%), moderate exposure (CES scores of 1–24; 34%), and heavy (CES scores > 24; 8%). We compared each of the items across combat exposure levels, using chi-square tests of independence. Results are shown in Tables 4 and 5 for positive and negative outcomes, respectively. Within each table, the items are grouped into the categories identified by Elder and Clipp. For example, in the first row of Table 4, 21 percent of the veterans with no combat exposure endorsed lifelong friends as

TABLE 2  
Combat Experiences of Normative Aging Study (NAS) Veterans

	World War II <sup>a</sup>	Korea <sup>b</sup>
Combat Exposure Level		
None (0)	46%	81%
Light (1-8)	19%	10%
Light/Moderate (9-16)	13%	4%
Moderate (17-24)	11%	3%
Moderate/Heavy (25-41)	11%	2%
In combat 1 or more months	41%	12%
Exposed to combat outcomes 3+ times	30%	10%
Wounded	7%	3%
Participated in major battle(s)	36%	6%
Unit killed enemy	27%	6%
Personally killed enemy	12%	4%
Ever had survivor guilt	21%	13%

<sup>a</sup>N = 809. <sup>b</sup>N = 401.

is an excellent study and provides the best information currently available on the relation between psychometric and clinical assessments of PTSD, the sample was comprised of Vietnam veterans. Lacking any comparable data on older veterans, we were forced, as was Page (1992), to use the best available information. However, it is possible that the cutoff scores we have used are not optimal for older community-residing veterans, and that we have consequently misestimated the prevalence of PTSD symptoms in this group. We have just begun a study, funded by the VA, to determine suitable cutoff points on several questionnaire measures for older, community-residing veterans.

To provide an estimate of exposure to lifetime noncombat trauma, we created a brief, 11-item measure that asked about personal, familial, or occupational exposure to three classes of events (serious accident, violent crime, natural disaster). In addition, we asked participants to report other personal noncombat trauma, and nonmilitary occupational injury. Responses to all items were dichotomous; we treated any positive response as indicating exposure to noncombat trauma. These

measures were included in the second survey on military service mailed to NAS participants in November 1990.

#### RECENT FINDINGS FROM THE NORMATIVE AGING STUDY

To illustrate a life-span approach to the study of military service, we present below an overview of some results from the Normative Aging Study, organized as responses to questions.

#### *What Is the Prevalence of PTSD in Older Veterans?*

The first question we addressed is whether we could identify PTSD among older, community-residing veterans, and if so, whether it was related to combat exposure (Spiro et al., 1994). Over 54 percent of our World War II and 19 percent of our Korean veterans reported combat exposure. Among the World War II cohort, 22 percent had moderate to high exposure (Table 2). Because so few Korean veterans reported combat exposure, we dichotomized the ordinal exposure scale for this group. Depending on the measure used, the prevalence of PTSD ranged from 0 to 12.4 percent across levels of combat exposure, and was generally much higher based on the PK scale than on the Mississippi Scale (Table 3). Only 7 of 1,210 veterans exceeded the threshold for caseness on the Mississippi, indicating a current prevalence of 5.8 cases per 1,000 men. This figure is considerably lower than estimates reported for Vietnam veterans (15%; Kulka et al., 1990), for older veterans seeking VA medical (18-30%; Blake et al., 1990) or mental health (16-65%; Garfein, Ronis, and Bates, 1993; Rosenheck and Fontana, 1994) treatment, or for POWs (30-70%; Eberly and Engdahl, 1991).

Scores on the MMPI-2 PK scale were unrelated to combat exposure. PTSD as measured by the Mississippi Scale was related to combat exposure, and more strongly for the World War II cohort, ranging from 0.27 percent in men with no exposure to 3.45 percent among men with heavy exposure.

TABLE 3  
PTSD Cases (per 1,000 Men) by Conflict and Combat Exposure

Combat Exposure Level	Cases per 1,000	
	Mississippi	MMPI-2 PK
<i>World War II</i>		
None	2.7	6.2
Light	0	5.8
Light/moderate	9.4	5.4
Moderate	11.2	123.5
Moderate/heavy	34.5	62.5
POOLED	7.4	67.0
<i>Korea</i>		
No combat	3.1	68.8
Any combat	0	50.0
POOLED	2.5	65.3

These results suggest that (1) the Mississippi Scale is preferable to the MMPI-2 PK scale for assessing combat-related PTSD among older veterans and that (2) the intensity of a traumatic event (e.g., combat) is related to the presence of PTSD symptoms. As much as 40-50 years later, combat exposure continues to have negative effects for some veterans. It is likely that the prevalence of PTSD among combat veterans would be higher in a less select sample, such as VA patients, because NAS men were selected 30 years ago for good physical health, and are relatively socially advantaged.

#### *Is This Prevalence Similar to That of VA Patients?*

To examine the prevalence of PTSD in a less select sample than the NAS, we considered the Veterans Health Study (VHS; Kazis et al., 1995). The VHS is a longitudinal study begun in 1992 to examine the health and health care use of patients using any of four VA ambulatory care clinics in the Boston area. The sample currently consists of 1,668 male patients, aged 21-90 ( $M = 62$ ) of whom 92 percent are white and 58 percent